

A Deployable High Gain Reflectarray (DaHGR) Antenna

Author

Jeff Harvey MMA Design LLC

Concept Collaborator

Colleen Harvey MMA Design LLC



www.mmadesignllc.com

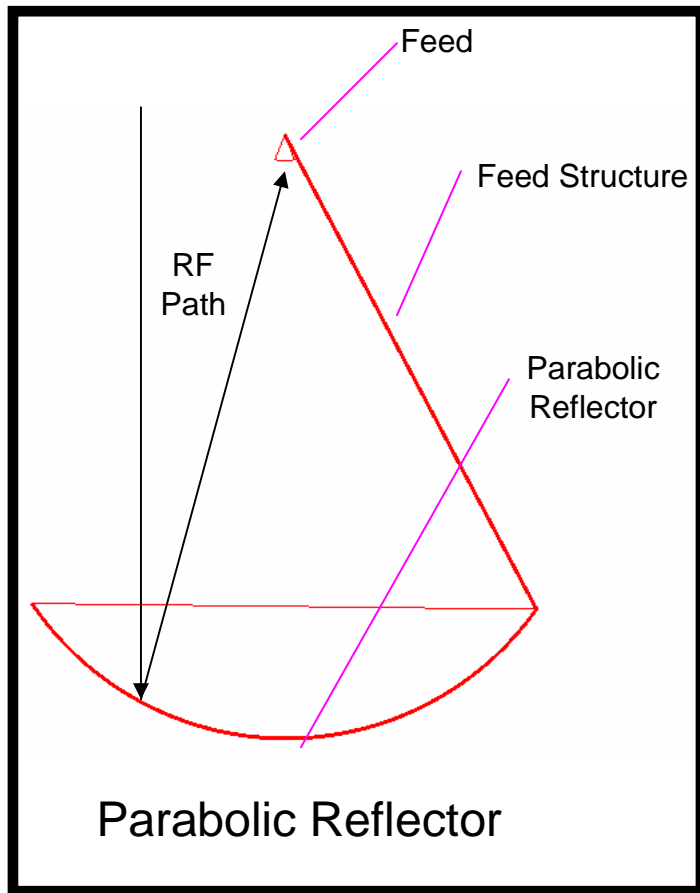
DaHGR Antenna

A CubeSat High Gain Antenna for Mars Missions

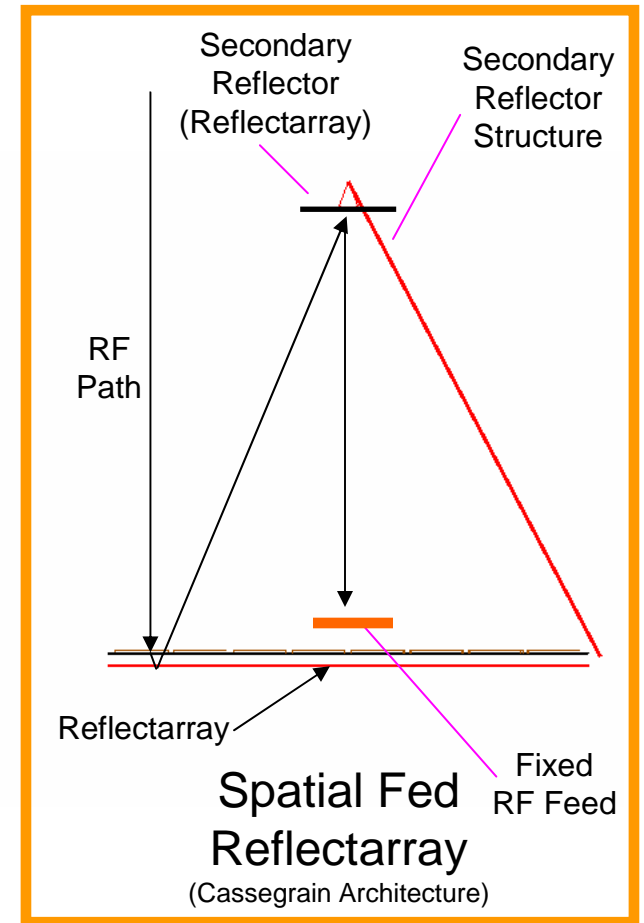
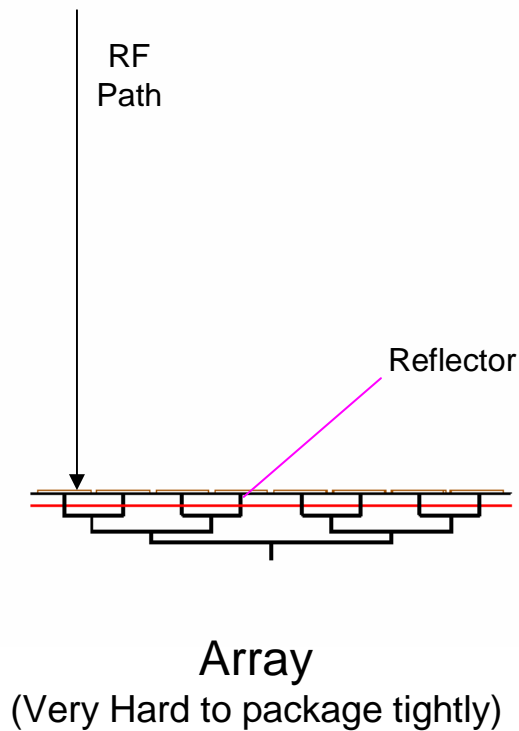
- Direct communication from Mars will require a high gain antenna
- DaHGR fits in a CubeSat class vehicle
 - 1 meter in a 1U volume
 - 2 meters in a 2U X2U x 1.5U volume
- DaHGR makes stand alone 6U Mars missions practical



Antenna Architectures



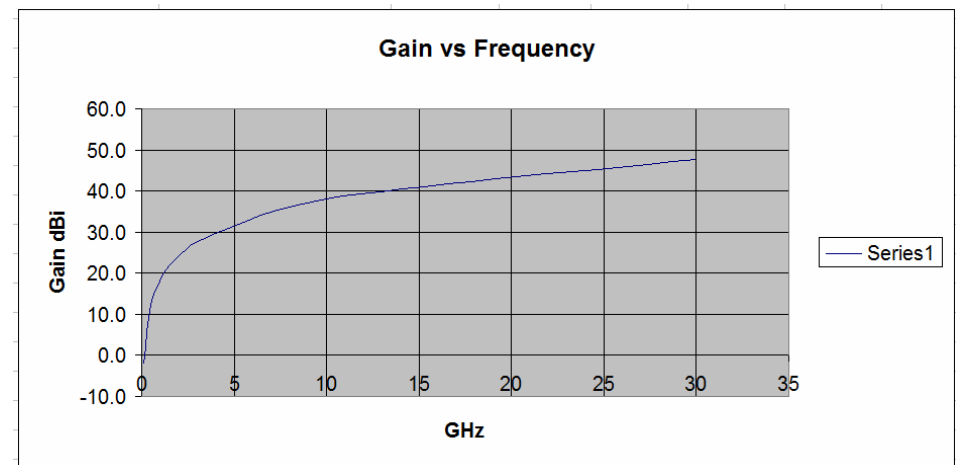
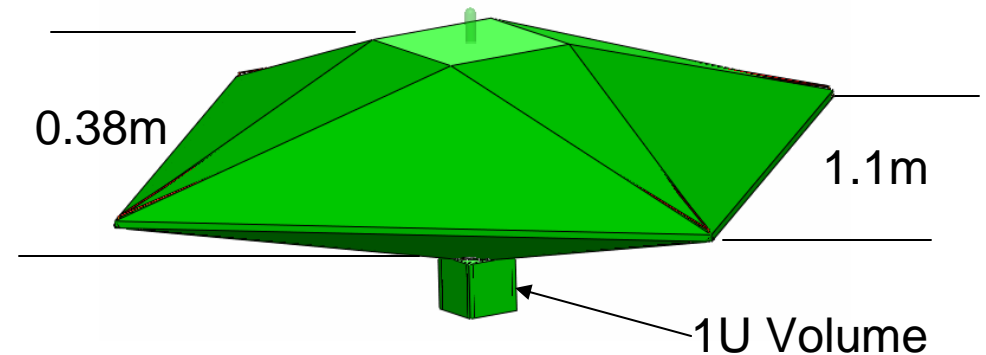
Conventional Method



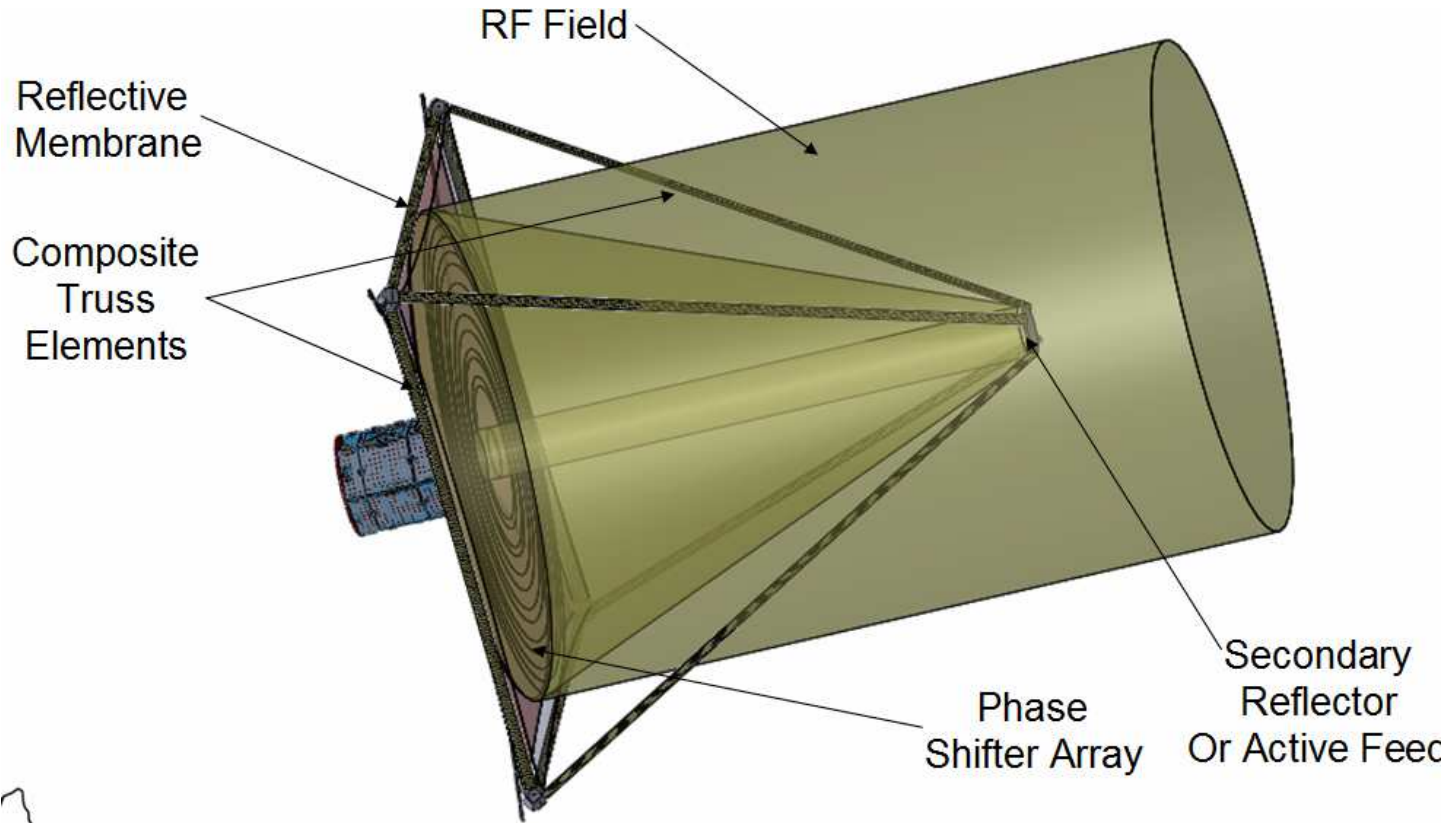
DaHGR

CubeSat DaHGR Overview

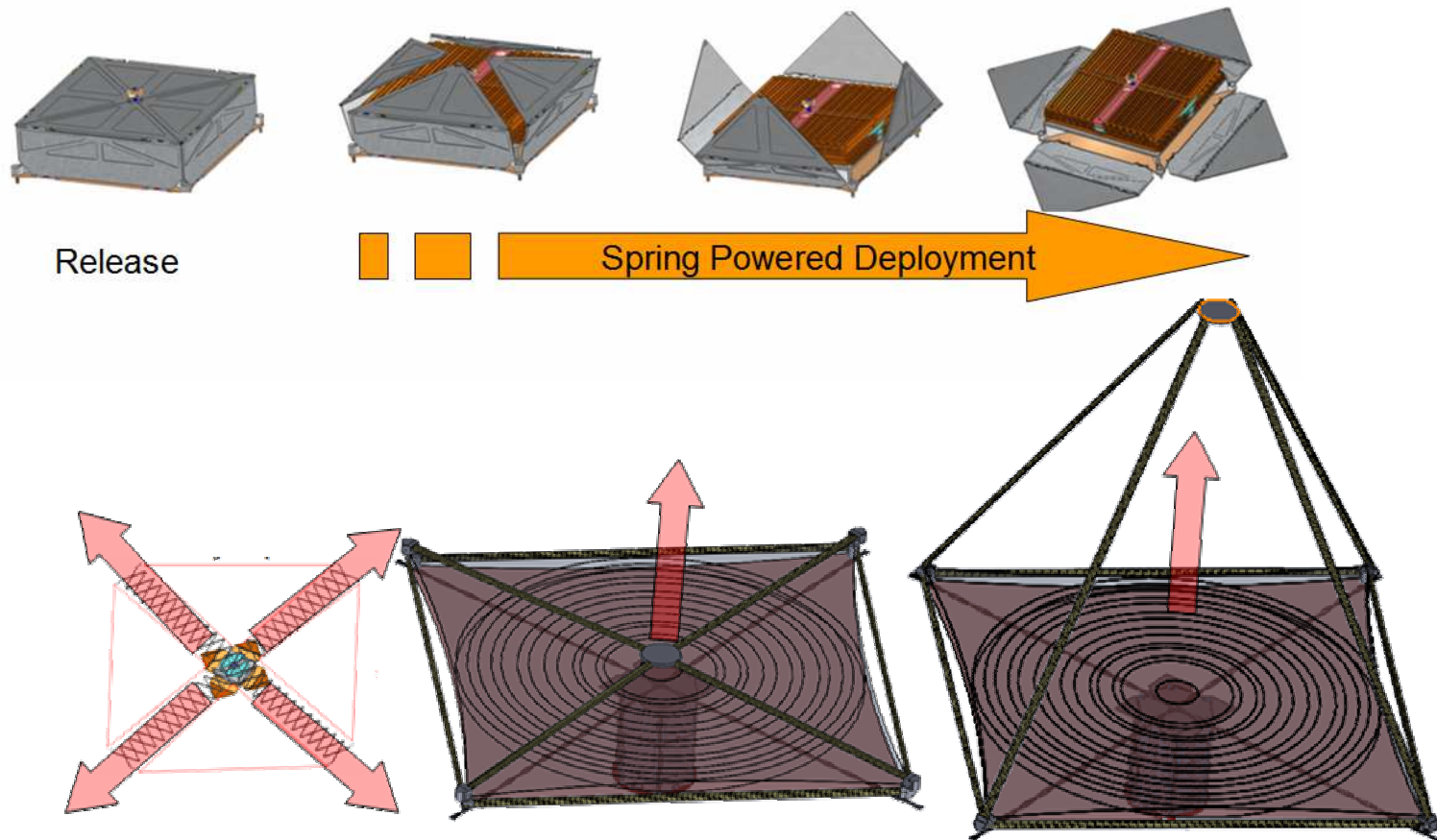
- DaHGR-Deployable High Gain Reflectarray
- Based on existing flight heritage materials, assemblies and methods
- MMA teamed with a major RF spacecraft company to develop DaHGR
- DaHGR is scaleable to 5m
- 1U stowed envelope
 - Deploys to surface of stowed envelope
- 1m deployed aperture
 - Cassegrain architecture
 - Feed at SC interface
- Mass- 975 gr.
- Integral melt wire launch restraint
- Volume deployed (see graphic)
- 38dBi at X band



Deployed Configuration

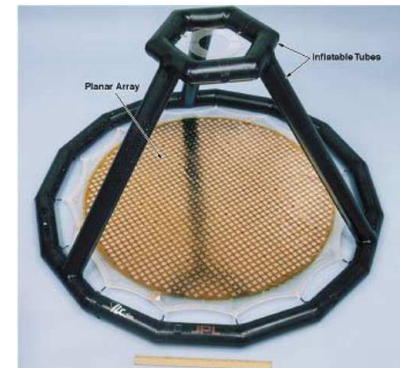


Deployment Sequence



DaHGR Conclusion

- DaHGR is a **low stowed volume** - **large area** CubeSat high gain antenna
- Uses thin film reflectarray antenna technology
- Applies MMA's flight heritage thin membrane deployment system
 - Printed reflectarray technology reduces cost
 - Reduces stowed volume
- DaHGR is TRL4



JPL Inflatable
Deployment
Reflectarray
From 1990's